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Source: *The Scientific Monthly*, Vol. 42, No. 1 (Jan., 1936), pp. 30-39

Published by: [American Association for the Advancement of Science](#)

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Accessed: 01/05/2014 15:20

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# SCIENCE ADVISORY SERVICE TO THE GOVERNMENT

By Dr. KARL T. COMPTON

PRESIDENT OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY AND CHAIRMAN  
OF THE SCIENCE ADVISORY BOARD<sup>1</sup>

IN his book, "The Advance of Science," Mr. Watson Davis has estimated the total national expenditure for work in science by government, industry, foundations and universities combined to be of the order of one hundred million dollars per year. Of this amount, roughly one third appears in the budgets of the scientific bureaus of the Federal Government, and roughly one third each is expended by universities and industries. Because of the difficulties in defining scientific work and of securing data on comparable bases, these estimates can only be considered to represent the orders of magnitude. They do, however, give an idea of the dollar value which the general public places upon the scientific work which forms a basis for its future welfare.

In comparison with the total national budget, the expenditures for science are an exceedingly small item. Scientific work of the government accounts for considerably less than half of 1 per cent. of the Federal budget. The total national expenditure for science amounts to something like the cost of a half-dozen warships. Altogether it amounts to about one cent out of every five dollars of the total national income. On the other hand, it is this scientific work which has brought about our present standard of living and which is basic to our opportunities for future betterment in health,

<sup>1</sup> In this article the author draws freely from the experience and studies of the Science Advisory Board and the ideas of his colleagues, but he takes personal responsibility for such opinions as are here expressed in regard to the organization and functioning of a Science Advisory Service to Government.

industrial and agricultural prosperity, and in avoiding those misfortunes which will otherwise inevitably beset us with the exhaustion of certain natural resources.

In this public service of science and scientists, the government, of necessity, plays a rôle whose importance to the country is far greater than the proportionate amount of interest and support which it customarily receives from the occupants of political office. Fortunately, however, there have been, from time to time, public administrators of great vision who have realized the immediate services and ultimate values of scientific work and have brought about the establishment of various scientific bureaus. Fortunately also these bureaus have attracted a great group of able and loyal public servants without whose co-operative effort a great and complex country like ours would utterly fail to function. They advise us regarding the weather, maintain consistency in our technical and manufacturing standards, aid and advise the farmer, maintain the safety and improve the quality of transportation, maintain our health and in innumerable ways aid every group of our population. To quote from the second annual report of the Science Advisory Board:

In a democracy like ours, designed to safeguard personal liberty and to stimulate individual initiative with the framework of "general welfare," there is no need for the Government to embark upon comprehensive programs in pure science, invention or industrial development. There are, however, numerous scientific services of such wide scope and universal utility that no agency except the Government is competent

adequately to handle them. There are other scientific services which are essentially supplementary to non-scientific governmental activities. There are also fields of scientific or technical development which hold evident promise of benefiting the public but which are not proper or practical fields for private initiative. In these three categories and in this order of importance lie the proper scientific activities of the Government.

The first scientific bureaus to be established had to concern themselves but little with the coordination of their programs. Each filled a definite need and its purpose was to gather facts in a designated field. Each one was organized because of clearly recognized national opportunities. The several fields of science are now rather fully represented by bureaus. This has led to duplication of effort because the boundary lines between fields of science have tended to grow indistinct. We now talk much more about the borderlands of science. Side by side with the growth in the number of bureaus and in the multiplicity of their functions, there should have been applied the principle of coordination of related work, no matter in what bureaus the work may be done.

Freedom of scientific work from political or policy-making influences is a second prime consideration. It is not our function to appraise national planning by federal agencies or express an opinion on it. Whatever the trend of social or political thought and whatever the degree of national planning, the people of the country have the right to expect that the scientific services are always free to report and interpret the facts in a given field of enquiry as they find them and not as the government of the day may wish to have them reported or interpreted.

Over and above the work of particular scientific bureaus, there is increasing activity on the part of the Government in undertaking large projects whose feasibility or justification are matters for technical decision from many points of view: scientific, economic, humanitarian. Examples of such projects are: irrigation, power development, flood control, soil erosion control, shelter belt, waterways, retirement of sub-marginal land and colonization. Where huge sums are involved and large groups of people affected, it is more than ever necessary that decisions and policies should be settled only after the most thorough, competent and disinterested study of such questions as: Is the project technically feasible? Will it accomplish its purpose? What are the alternatives, and has the best plan been selected? Will the benefits justify the expenditure? For technical advice on such questions, Congress and the Executive Departments should have ready access to, and should use, the best talent available both within and outside of the government services.

In an economic and social structure of growing complexity which we witness everywhere to-day, government, either federal or local, must of necessity assume a more positive rôle than was required in a simpler civilization. The extent of these new responsibilities is one of the most important questions of our times, but it is reasonable to assume that the guiding hand of government will not be relaxed in the future. With government in the stage of transition from the more passive and regulatory part played in the past, to one of more intelligent and broad supervision and initiation, it is the concern of every citizen that there be available to government the most competent and impartial advice which can be found. The endurance of our traditional form of government will depend in increasing measure upon the quality of expert judgment, tempered with experience, which is available to government, and the willingness of government to follow such judgment.

The people of the country thus have a vital interest in the essential scientific services of the Government. It is to the people that the Congress and the Administration are responsible for the effective and efficient operation of these services. It is, therefore, both proper and essential that the scientific personnel of the country, outside the government bureaus, should take an active and cooperative interest in seeing that the scientific work of the Government is conducted in such manner as to render the necessary services effective from the standpoint of science and efficient from the standpoint of management. In science, as in other fields, "to omit from the councils of men any sources of wisdom, judgment, or experience, or to ignore the normal aspirations of any group in the determination of public policy, is to rob society of some of the quality it might possess."

The scientific work of the government can not be maintained on a plane of high efficiency, and have the scope that the national welfare demands, unless the best civilian as well as official judgment is applied to the problems of the several bureaus and their personnel. Congress has both the right and the duty to determine the worth of the scientific bureaus and make appropriations for their support. But in arriving at such a determination the individual members of Congress and the appropriate Congressional committees need to call upon disinterested civilian judgments outside the bureaus and not rely wholly upon the advice and information presented by the

bureau officials concerned. When the latter are efficient and broadminded, as most of them are, little more than confirmation of judgment and opportunity for helpful discussion may be contributed from outside sources. But neither the existing methods of selection and appointment of bureau chiefs, nor the coordination of their work, has reached the point of desired efficiency. It is a commonplace that projects are not always dropped when completed; that coordination is not always welcomed; that personnel is not always as alert and competent as it should be; that duplication of effort amounts in some instances to a disease; that the effective relation of governmental to non-governmental agencies is not a lively concern of some scientific bureaus; that the best advice is not always sought in the public interest; and that the better judgment of bureau chiefs can not always stand up, unaided, against political pressure for certain programs and expenditures.

Still more important, in the long run, is guardianship by scientific men outside the government lest the scientific bureaus be used for political ends. As fact-finding agencies the scientific services should be free to produce results that are not discolored by the opinions and snap judgments of policy-making political groups who may wish to put the dignity of "science" behind their plans in order to win public approval.

Granting, therefore, the need and opportunity for a science advisory service, there is required a form of organization that can function effectively and a personnel that is informed, alert, judicial, courageous and wise. In the last analysis "by their fruits ye shall know them"; in other words, the strength and value of any science advisory body will grow or die in accordance with its ability to render valuable service, whatever may be its authority, composition or procedure. Recent events have given scientists an unprecedented opportunity to partici-

pate in the solution of important problems of policy, administration and personnel, by advising responsible officers of the government. On the degree of their ability cooperatively to handle this opportunity will largely depend its continuance and extension.

All through history from the time that Archimedes was called on to aid, by his scientific inventions, in the defense of Syracuse, scientific men have been called to work for their governments and to advise them on matters within their fields of expert knowledge. Experience has indicated that there is no group more eager to place their knowledge and services at the disposal of the government, even at considerable personal sacrifice. Experience has also shown that these advisory services to government may be of great value if properly organized and treated with understanding and respect by those in political power.

An outstanding example of successful scientific advisory service to government is found in the present organization of advisory councils to the British Government. The first of these councils to be organized, and the one having the most extensive responsibilities, is the Advisory Council to the Department of Scientific and Industrial Research. The ten members of this council are chosen for their scientific and industrial qualifications and are appointed for terms of five years by the lord president of the Privy Council after consultation with the president of the Royal Society. The annual parliamentary grant for governmental scientific and industrial research is expended in a manner recommended by this advisory council, and the Department of Scientific and Industrial Research is in fact the administrative agency for carrying out the recommendations of the advisory council when approved by the lord president. The members of this council attend meetings on official business on about twenty days in each year and receive an honorarium of 150 pounds

per annum in lieu of reimbursement for personal expenses. In addition to the responsibility for governmental research agencies, this advisory council also submits recommendations for governmental grants to universities for research projects and research fellowships and also to industrial associations on a joint contributory basis for scientific research of general benefit to these industries.

There is an analogous Medical Research Council and an Agricultural Research Council, both organized under the Privy Council and with similar responsibilities in their special fields. The finest scientific and industrial talent of the country is freely drawn upon by the government in the appointments of these advisory groups. It takes only a superficial study of the operations of these councils and their numerous subcommittees to become quickly convinced of the effective manner in which this sister English-speaking nation has created a plan of cooperation between the technical talent of the country and the government, which is leading to splendid results for the economic and social welfare of the country.

There are similar tendencies in the other European nations. In Norway, for example, no appropriations are made to certain scientific services of the government without examination and approval by a distinguished civilian advisory committee, and the government now has under way a study of means of improving and extending this advisory service. In Italy the National Research Council is assisting the government to bring about more comprehensive programs of research by Italian industrial organizations. In Russia the Academy of Sciences of Moscow has been called upon to aid the government in organizing the great system of research institutes recently created throughout the country and now in process of doing some of the finest and most progressive scien-

tific work to be found anywhere in the world.

In the United States three notable steps have been taken by the Federal Government to provide for itself disinterested and competent advice upon scientific matters:

(1) The National Academy of Sciences was established by an act of Congress and approved by President Lincoln on March 3, 1863, with the specification that "the Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment and report upon any subject of science or art, the actual expense of such investigations, examinations, experiments and reports to be paid from appropriations which may be made for the purpose," subject to the condition that "the Academy shall receive no compensation whatever for any service to the Government of the United States." Throughout its history the academy has rendered valuable service, principally in advising the government in regard to the organization of some of the federal scientific bureaus. In comparison, however, with the magnitude of scientific activity in the government and continued importance of problems involving organization, programs, personnel and budgets, I think that it may fairly be said that this arrangement has fallen far short of meeting the needs and opportunities for scientific advisory service. For example, the academy has been called upon by governmental agencies only about 100 times in the last seventy-two years, and of the eleven subjects thus referred to the academy directly by the Congress, only three related directly to the program or administration of the federal scientific services. These involved the National Board of Health (1870), the Coast and Geodetic Survey (1884), and a general report on the scientific work of the scientific services (1909). The other requests concerned scientific ques-



tions such as the introduction of the metric system, vivisection, the adoption of centigrade and Fahrenheit temperature scales and other matters of like nature.

The reason for this relative inactivity of the academy in the field in which it was created to perform can not, in my judgment, be ascribed to dearth, in the academy membership, of men eminently qualified to advise the government on its scientific problems, for there is no question but that its membership has contained men of outstanding distinction and accomplishments in all fields of science. There may be a minor element of weakness in the very fact that absence of active duty in advising the government has resulted in relatively little attention by the academy to peculiar qualifications for such service in considering nominees for election.

I believe that the major weakness in the present organization of the National Academy of Sciences, as an agency for advising the government upon scientific matters, lies in the phrase "whenever called upon by any department of the Government." There is no provision in the government, as there is in the British Government, whereby the scientific advisory services are automatically called upon when important scientific problems arise. The result is that few of the high administrative officers in the government, as they change from one administration to another, realize or take advantage of the opportunities for disinterested and competent assistance from the academy in handling the problems continually arising in the administration of the scientific bureaus under their jurisdiction. As a consequence this type of service has not been actively in the minds of the members of the academy, of whom the majority have rarely, if ever, been called upon to exercise this advisory function.

While, therefore, the National Academy of Sciences has had a distinguished history and has performed some very

useful functions for the advancement of science, it has not handled the needs and opportunities for scientific advice to the government in an adequate manner. This failure is no reflection on the academy but has been, I believe, inherent in its organization and is also due in part to the type of public servant who is usually elected to high office in our government. For the most part these men have a legal training and a political and opportunistic outlook. They may be able and well-intentioned, but they, too, rarely have a sufficient scientific background or philosophic outlook to give them a sympathy and understanding of the nature, purposes and values of scientific work.

(2) The National Research Council was organized by the National Academy of Sciences in 1916 at the request of President Wilson as a measure of national preparedness in the face of the serious international situation at that time. At the President's further request, it was perpetuated by the National Academy of Sciences on April 29, 1919. As stated in its articles of organization, the purpose of the National Research Council is "to promote research in the mathematical, physical, and biological sciences and in the application of these sciences to engineering, agriculture, medicine, and other useful arts, with the object of increasing knowledge, of strengthening the national defense, and of contributing in other ways to the public welfare, as expressed in the Executive Order of May 11, 1918." This executive order stated the objectives of the National Research Council to be "to stimulate research . . . , to survey the larger possibilities of science, to formulate comprehensive projects of research, and to develop effective means of utilizing the scientific and technical resources of the country for dealing with these projects, to promote cooperation in research at home and abroad . . . , to serve as a means of bringing American and foreign investigators into active co-

operation with the scientific and technical services of the War and Navy Departments and with those of the civil branches of the Government, to direct the attention of scientific and technical investigators to the present importance of military and industrial problems in connection with the war . . . , and to gather and collate scientific and technical information.”

The National Research Council is, in a sense, an operating arm of the National Academy of Sciences and is permanently organized into divisions with representatives from all major scientific bodies. These divisions are served by numerous permanent and temporary committees, whose membership in each subject represents a cross-section of American leadership in the respective fields within and without government circles. There is thus provided an extensive framework for mobilizing the scientific forces of the country, which functioned with great effectiveness during the war and which is permanently available, even if not always active, as an important element of national preparedness.

The National Research Council is admirably set up to assist the government in one aspect of science advisory service; namely, in the organization and supervision of cooperative investigations aimed at specific scientific or technical objectives of interest to the scientific bureaus. For such purposes, the National Research Council is continually active, though, like other organizations, this activity is limited through limitation of funds for operating expenses. In its present organization, however, the National Research Council is not well organized for rendering effective advisory service to the government in matters of policy or organization. Its essentially representative character is admirable from the point of view of coordinating scientific agencies, but is not well adapted to the selection of the best personnel for advisory service on matters of policy.

Furthermore, an inherent element of strength of the National Research Council is the inclusion of representatives of the governmental scientific services, but for obvious reasons, any organization which is created to give disinterested advice to the government on matters of policies, programs and administration of its scientific bureaus, can not contain in its membership representatives of these bureaus. For these reasons, therefore, the National Research Council is not well adapted to act as scientific adviser to the government.

(3) The Science Advisory Board was appointed by Executive Order of President Roosevelt on July 31, 1933, “in order to carry out to the fullest extent the intent of the above Executive Order (that of President Wilson creating the National Research Council)—with authority, acting through the machinery and under the jurisdiction of the National Academy of Sciences and the National Research Council, to appoint committees to deal with specific problems in the various departments.” This board was created for a limited period, which expired on December 1, 1935, and was composed of the following scientists and engineers:

- Karl T. Compton, *chairman*, president of the Massachusetts Institute of Technology, Cambridge, Massachusetts.
- Roger Adams, professor of organic chemistry and chairman of the department of chemistry, University of Illinois, Urbana, Illinois (president-elect of the American Chemical Society).
- Isaiah Bowman, chairman, National Research Council; Director, American Geographical Society, New York City (now president of the Johns Hopkins University).
- W. W. Campbell, president, National Academy of Sciences, Washington, D. C.
- Gano Dunn, president, J. G. White Engineering Corporation, New York City.
- Simon Flexner, formerly director of the laboratories of the Rockefeller Institute for Medical Research, New York City.
- Frank B. Jewett, vice-president, American Telephone and Telegraph Company; president, Bell Telephone Laboratories, Incorporated, New York City.

Lewis R. Jones, professor of plant pathology, University of Wisconsin, Madison, Wisconsin.  
 Charles F. Kettering, vice-president, General Motors Corporation; president, General Motors Research Corporation, Detroit, Michigan.  
 C. K. Leith, professor of geology, University of Wisconsin, Madison, Wisconsin.

Frank R. Lillie, Andrew MacLeish distinguished service professor of zoology and embryology and dean of the biological sciences, University of Chicago, Illinois.

John C. Merriam, president, Carnegie Institution of Washington, Washington, D. C.

R. A. Millikan, director, Norman Bridge Laboratory of Physics, and chairman of the executive council, California Institute of Technology, Pasadena, California.

Milton J. Rosenau, Charles Wilder professor of preventive medicine and hygiene, Harvard Medical School, and professor of epidemiology, Harvard School of Public Health, Boston, Massachusetts.

Thomas Parran, state commissioner of health of New York, Albany, N. Y.

The most active work of this board has been done through its nineteen special committees with an aggregate personnel of 101 scientists, engineers and industrialists, who, in each case, were selected for their peculiar fitness for the problem in question. It is significant proof of the willingness of the highest type of technical talent of the country to serve the government on important matters that not a single individual who was asked to serve on one of these committees refused the assignment. In some cases this work involved several months of almost continuous duty and in all cases was done without remuneration except for reimbursement of personal expenses incurred. These committees were usually under the chairmanship of a member of the board and were given the greatest freedom of initiative, and absence of red tape, actively to pursue their objectives. The effectiveness of their work is due jointly to their able personnel and to the freedom and responsibility which was given them.

The board as a whole met at intervals of two or three months to plan the organization of new projects, to receive and discuss the reports of its committees and

to take action on matters of policy. While the committees were given great freedom in carrying out their studies and formulating their recommendations, the board itself exercised control of the manner in which these recommendations were submitted to the appropriate government officials and carried on the subsequent work of conference with these officials for the purpose of putting the recommendations, as far as possible, into effect.

The scope of activities of the Science Advisory Board is best illustrated by the names of the committees. These committees were set up to handle specific assignments, but most of them handled a succession of problems submitted to the board from the responsible government officers, who included department secretaries, the director of the budget, the federal coordinator of transportation and the President himself.

#### Executive Committee.

Committee on the Weather Bureau

Committee on the Geological Survey and Bureau of Mines

Committee on Economic Resources of the Boulder Dam Region

Committee on the War and Navy Departments

Committee on the Policy of the Government in relation to scientific research

Committee on Land Use

Committee on the relation between fundamental sciences and the scientific study of human problems

Committee on Railway Research

Committee on the Bureau of Standards

Committee on Surveying and Mapping Services of the Federal Government

Committee on Research in the Land-Grant Colleges

Committee on the Bureau of Chemistry and Soils

Committee on Soil Surveying and Soil Research

Committee on Medicine and Public Health

New Industries Patent Committee

Committee on the Design and Construction of Airships

Committee on Signalling for Safety at Sea

Committee on Biological Abstracts

In addition to the work suggested by these committees, there were some activities of a confidential nature, not publicly reported, and there were others which were carried through by the board as a



whole, notably the recommendation to the President of "A National Program for Putting Science to Work for the National Welfare."

Although the executive order of the President assigned to the Science Advisory Board a task which proved to be of considerable magnitude, no provision was made for financing the operations of the board. The necessary expenses of operation included secretarial help and office supplies, reimbursement of travel and other out-of-pocket expenses of the board and its committees, and occasionally the employment of an expert to gather and collate necessary information. The appointment of the board would therefore have been largely futile had not the Public Administration Clearing House made an initial grant to support the work of the board in its first month or two, and had not the Rockefeller Foundation then stepped into the breach and made an appropriation to the board of \$50,000, which was just sufficient to cover its operating expenses for the balance of its term of appointment.

It would be impossible in this brief article to go into the details of the activities of the Science Advisory Board. A full description of these activities may be found in the two official reports of the Science Advisory Board, published in September, 1934, and November, 1935. A limited number of copies of these reports is available on application to the National Research Council, 2101 Constitution Avenue, Washington, D. C. It may be interesting, however, to summarize very briefly the extent to which the work of the board has led to positive results.

In several instances the board was requested by department secretaries to nominate candidates for appointment to the highest administrative posts in scientific bureaus. In every case the appointments were made in accordance with the nominations submitted by the board.

In a goodly number of cases the recommendations by the board have been put completely into effect. These cases include the consolidation and strengthening of the Mineral Statistics Services, the institution of scientific methods for determining the efficacy of measures to combat soil erosion, increased appropriations for scientific research in the public health service, the appointment by the President of a planning committee on mineral policy, the introduction of new features of program and interdepartmental coordination in the work of the United States Weather Bureau, and the introduction of a cost accounting system with a new form of organization for appropriation purposes in the activities of the National Bureau of Standards.

In the majority of cases the recommendations of the board have been partially put into effect as fast as appropriations, personnel or ability to secure necessary authorization or cooperation have permitted. In this category satisfactory progress is being made in the organization of a cooperative research agency by the Association of American Railroads, in the application of new methods of forecasting by the Weather Bureau, in a realignment of some aspects in the programs of the Geological Survey, Bureau of Mines and Bureau of Standards, and in the modification of practices in the Patent Office and in the handling of patent cases in the courts.

In some cases the board's report was purely factual, as in the study of the economic resources of the Boulder Dam region and in the compilation of information and programs for the use of federal agencies engaged in studies of soil erosion and land use.

In the report on mapping services of the Federal Government, there was recommended a consolidation of those bureaus whose sole activity is the production of maps to form a single efficient mapping bureau. It was shown that

decided economies could thereby be secured and that the enormous economic interest of the country in the completion of its mapping program could be greatly facilitated. Unfortunately, lack of authorization to effect these consolidations has blocked the favorable action which for a time appeared probable, and it is greatly to be hoped that this subject will receive due consideration in the next session of Congress.

On the whole the board feels that the positive results of its work have been as great as could reasonably have been expected and it offers tribute to the sincere desire of government officials to conduct the affairs of the scientific bureaus for which they are responsible in such manner as to give the best possible service to the country. The friendly cooperation of department secretaries and bureau officials throughout has been most noteworthy.

#### CONCLUSION

Whatever may have been the successes and failures in the efforts of the National Academy of Sciences, the National Research Council and the Science Advisory Board to render effective advisory service to the Federal Government, there is no doubt that the most important consideration is of the future rather than the past. The ideal program would be the planning of a science advisory service based upon the lessons from all past experience. Realizing this fact, the President has opened the way for such a constructive step through the following letter addressed to the president of the National Academy of Sciences.

#### THE WHITE HOUSE

Washington

July 15, 1935

Dr. Frank R. Lillie,  
President, National Academy of Sciences,  
Constitution Avenue and 21st Street, N.W.,  
Washington, D. C.

*My dear President Lillie:*

In accordance with recommendations from you and from Doctor Karl T. Compton of the

Science Advisory Board, I am signing an Executive Order extending the Science Advisory Board to December 1, 1935, in order that the work now under way can be carried on until more permanent arrangements are made by the National Academy of Sciences.

The National Academy of Sciences under the provisions of its Congressional charter is required "whenever called upon by any department of the Government to investigate, examine, experiment and report upon any subject of science or art." It has, through its National Research Council, permanently organized contacts with the scientific and technical bodies of the country. During the past two years it has been implemented by the Science Advisory Board, through which its members have become more intensively acquainted with the scientific services of the Government and their problems.

In order to secure the most effective scientific advisory service, based on the experience of these three agencies, I hereby request the Academy to provide some single agency, board or committee which can carry on the work of the Science Advisory Board and related activities after December 1, 1935.

Upon receipt of word from the Academy as to the committee or other organization through which the Academy wishes to perform this service, I shall be glad to request the Government departments and scientific bureaus to utilize and cooperate with that agency.

Sincerely yours,

S/ FRANKLIN D. ROOSEVELT.

Just what form this revised science advisory service will take as to its organization and methods is now in process of development. Certain aspects of the situation must receive consideration. It is important that duplication of science advisory services be eliminated as far as possible and that the existing ones be closely coordinated.

For this reason a science advisory service should certainly be set up under the Congressional authority vested in the National Academy of Sciences but in such manner as to avoid any conditions which may hitherto have prevented the academy from its best possible performance in this field. It is also important that the science advisory service operate in sympathetic coordination with the National Resources Committee, which has been given broad powers to coordinate and mobilize the resources of the country, both physical and intellectual.

The Science Advisory Board, in March, 1935, submitted to the President a recommendation embodying its best judgment at that time in regard to the organization of a permanent science advisory service. Certain situations which have subsequently intervened make it probable that some details of this recommendation will have to be modified, but the basic features of the plan there outlined would seem to embody the best past experience of the United States and Great Britain as applicable to the situation under our own government.

This plan envisages the appointment of a central science advisory board or committee of completely non-political character, selected by the National Academy of Sciences. Such a board would have certain authority under the Congressional charter of the academy. In addition to this, it is believed to be essential that the board should have specific recognition and authorization by the President of the United States and his administration in order that it may readily be recognized and used by his official family of the department secretaries, since experience has shown that it is through these secretaries that requests for advice in scientific programs or policies are most frequently received. It is furthermore specifically recommended that the director of the budget be requested by the President to secure the advice of this board in regard to the budgets and appropriations of the scientific bureaus. While doubt has been expressed in some quarters as to whether such an arrangement would be entirely acceptable to all parties concerned, this plan has operated effectively in Great Britain and has precedent in our own

country in the work of the Fine Arts Commission. It has furthermore been warmly approved by a number of prominent men who hold, or have held, official positions in the government departments which are involved.

In order to enable such a central science advisory board to deal effectively with problems of the various departments, it is further recommended that permanent subcommittees of the central board be established in connection with the more important scientific bureaus of the government. Ever since the establishment of the National Bureau of Standards, there has been a visiting committee of this type, which has operated with considerable influence in consultations with the Secretary of Commerce, the director of the bureau and the director of the budget. More recently at the recommendation of the Science Advisory Board, a similar advisory subcommittee has been set up to serve the United States Weather Bureau. There are advisory committees also attached to the United States Public Health Service and the Geological Survey. The present proposal would coordinate these advisory groups through the central science advisory board and would bring to the aid of the Federal Government the best scientific and technical talent of the country in a coordinated advisory service on scientific matters. Such a comprehensive service would be of inestimable value to the future welfare of the country and it is greatly to be hoped that some form of organization along these general lines may be consummated and may receive from the government the necessary authorization and financial support for its effective functioning.